

Applicant : Ralph Beyer et al.
For : LARGE PACKAGE FOR THE TRANSPORT AND STORAGE OF
INSULATION ELEMENTS AND COMBINED IN MODULES
THEREFOR
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In the Specification:

Please insert the following heading before page 1, paragraph 1.

--FIELD OF THE INVENTION--

Please replace page 1, paragraph 1 with the following amended paragraph.

The invention relates to a large package ~~according to the preamble of claim 1~~ and to an insulation-element module ~~therefor according to the preamble of claim 21~~.

Please insert the following heading before page 1, paragraph 2.

--BACKGROUND OF THE INVENTION--

Please replace page 1, paragraph 3 with the following amended paragraph.

Large packages of this kind are known, for example, from EP 0 220 980 A1, in which insulation rolls or insulation-panel packets are packaged to modules, these modules are stacked one above the other and are then covered with a hood-like plastic-film wrapping. In this way, the largely exposed ends of the individual insulation rolls or insulation-panel packets are covered and protected on the outside by a hood-like covering or ~~else~~ by wrapping film, as a rule stretch film. Mineral-wool insulation elements are often hydrophobic as a result of a water-repellent agent having been added. However, non-uniform distribution of the water repellent agent and resultant capillary water uptake by the covered mineral wool can never be completely ruled out. Water uptake impairs the properties of the insulation material, however, and for this reason the outer covering of film on large packages of this kind can also be of closed configuration (DE 198 58 201 A1). This measure is intended to prevent the ingress of rain water or dirty water when the large package is set down on the ground. This is essential, particularly in view of the fact that owing to pollution in the air, rain water can show a certain degree of aggressiveness towards the ~~fibres~~ fibers of the insulation elements. With time, this can even cause damage to the ~~fibre~~ fiber structure and lead to impairment of the insulation elements' properties. DE 198 58 201 A1 describes a large package made up, in particular, of a

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number of insulation panels and including a pallet-like structure. The large package is encased in a closed covering of film. The covering is made of a material permeable to water ~~vapour~~ vapor so that water ~~vapour~~ vapor resulting from condensation can escape from the interior of the large package to the outside. Apart from the fact that applying a covering to packaging units of some size, especially to large packages, is a fairly difficult undertaking requiring special packaging facilities, large packages of this sort have the added disadvantage that although the insulation rolls or insulation-panel packets are protected by the covering over the large package while they are encased within, they are not protected - especially at their ends - once the large package is opened or, for example, damaged, and the sub-units are stored and transported on site. There is then a risk of water ingress, along with the associated disadvantages.

Please insert the following heading before page 2, paragraph 2.

--SUMMARY OF THE INVENTION--

Please delete page 2, paragraph 3.

Please replace page 2, paragraph 4 with the following amended paragraph.

According to an aspect of the invention, water is prevented from ingressing into a large package by protecting the individual modules within the large package in their entirety by a ~~waterproof i. e. watertight~~ waterproof, i.e., watertight, covering that is preferably permeable to water ~~vapour~~ vapor, but not permeable to water or other fluids. The covering encases the individual modules completely, so that the insulation rolls or insulation-panel packets contained therein are completely secure against water ingress. It is to advantage if the covering is composed of film such as shrink film. However, the film-like covering encasing the insulation rolls or insulation-panel packets can also be closed by overlapping the ends of the film and then bonding or welding them together in the overlap area.

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Please replace page 3, paragraph 2 with the following amended paragraph.

The covering is ~~waterproof i.e. watertight~~ waterproof, i.e., watertight, but preferably permeable to water-~~vapour~~ vapor, so that moisture exchange from the interior to the exterior is possible. This permeability to water ~~vapour~~ vapor ensures that in the case of inevitable water condensation during storage of the large package, the moisture within the modules or the large package can escape at elevated temperatures to the outside. Another advantage of the measures according to the invention ~~consists in~~ include that the large package can be packaged in a manner which is by all means conventional. In addition, the modules can also be held together to form a large package by using strap retainers or a hoop. It goes without saying that also a large package of the latter type can then be packaged with a film covering, should this be necessary. Of further advantage here is that should the outer film packaging around the large package be damaged, water is prevented from ingressing into any of the undamaged modules because they are effectively protected by the module covering. All in all, by implementing the measures of the invention, ~~i.e.~~ i.e., using only strap retainers or a hoop to hold the individual modules together, the outer film covering for the large package can be dispensed with and hence the cost of the packaging reduced. With this form of packaging for a large package, it is also possible to dispense completely with a pallet and to transport the entire unit, including the strap retainers, etc., by means of a crane or grippers.

Please replace page 3, paragraph 3 with the following amended paragraph.

As provided for in a further development of the invention, the covering for both the large package and the individual modules is expediently composed of a material which is moisture-adaptive, ~~i.e.~~ i.e., whose permeability to water ~~vapour~~ vapor varies as a function of the ambient humidity. It is expedient here to configure the material such that when the relative humidity of the atmosphere surrounding the covering is in the range from 30 to 50%, the material has a ~~water-vapour~~ water-vapor diffusion resistance of 2 to 5 m diffusion-equivalent air-layer thickness, and when the relative humidity is in the range from 60 to 80%, which corresponds to summer conditions, it has a ~~water-vapour~~ water-vapor diffusion resistance of

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< 1 m diffusion-equivalent air-layer thickness. When film of this kind is used, the perfect drying out of moisture and condensation water within the modules is ensured at all times. As a result, a sound guarantee that the insulation elements will retain their insulating properties even over extensive storage periods can be given. In the case of a moisture-adaptive covering, it is expedient if this, too, is composed of film; polyamides, preferably polyamide 3, polyamide 4 or polyamide 6 are particularly suitable. If the film used is of this kind, it need not be thrown away but can be used for another purpose, for example as an adaptive vapour- vapor barrier for high-pitched roofs.

Please delete page 4, paragraph 2.

Please insert the following heading before page 4, paragraph 4.

--BRIEF DESCRIPTION OF DRAWINGS--

Please replace page 5, paragraph 1 with the following amended paragraph.

Figure 1 shows an insulation blanket made of mineral wool, in particular glass fibres fibers that has- have been rolled under compaction conditions to a roll 1 and is wrapped in conventional manner in film 3 to retain the compacted form during transport and storage. The film 3 completely covers the cylindrical outer surface of the roll 1 and covers a part - indicated by the reference numeral 3' - of the ends 4 of the insulation-~~roll 2~~ roll 1. As covering for the insulation roll, shrink film or film that is bonded or heat-sealed in the overlap area is used. Suitable film materials include polyethylene, polyvinyl chloride, polyester, polypropylene and/or polyamide. The main function of the film 3 is to uphold the compacted state of the tightly rolled roll, so that it needs as little space as possible during transport and storage. The film 3 serves simultaneously to accommodate product names, which can either be printed directly on the film or on appropriate labels.

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Please replace page 5, paragraph 2 with the following amended paragraph.

On account of the need to save space, insulation rolls are generally rolled under compaction conditions that produce compaction ratios up to 1: 7 and more. In choosing the compaction ratio, however, care must be taken that the ~~fibre~~- fiber composite is not destroyed and that perfect elastic recovery of the unrolled insulation blanket to its nominal thickness is ensured.

Please replace page 5, paragraph 3 with the following amended paragraph.

Figure 2 shows an embodiment, according to the invention, of the module, which is illustrated here as a packaging unit for three insulation rolls of the type shown in Fig. 1. The module in general is identified by the reference numeral 5. The module is formed by encasing the insulation rolls 1, each of which, in turn, is wrapped in film 3, in a completely closed covering which, in the embodiment according to Figure 2, is formed by film 6. This covers the exterior circumferential surfaces of the adjacent insulation rolls 1 as well as the ends 4 of the insulation rolls, the ends 4 already being partially covered by the film 3 in the areas denoted by 3'. In other words, to form the module 5, the packet of insulation rolls is completely enclosed or packaged in a wrapping composed of the film 6; the module as such can also be subjected to a preceding compaction step. In the seam area, denoted by 7, the overlapping areas of film are welded, shrunk, bonded or otherwise suitably joined together. As is shown on the right of Figure 2, the film wrapping 6 is expediently configured such that an exposed edge 8, formed by film overlap, projects outwards and serves for handling the module during transport and storage. To this end, it is useful to provide additional handling means in the rib-like projecting edge 8, for example eyelets 9, which facilitate manual gripping and handling of the module 5. This film excess for the formation of the edge 8 can, if necessary, be suitably reinforced - for example by interposing a nonwoven fabric such as ~~glass-fibre~~- glass-fiber nonwoven fabric. It is to advantage, however, to use the film excess at the end of the packet, in the area denoted by 7, to form a rib-like or tongue-like edge corresponding to the illustrated edge 8.

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Please replace page 6, paragraph 5 with the following amended paragraph.

What is essential is that the module covering, which is composed of film in both embodiments, resembles a casing and completely encloses the insulation rolls or packets contained therein, so that the ingress of any water whatsoever, especially rainwater, is prevented by the waterproof film. The covering can, moreover, be designed such that it is permeable to ~~water-vapour~~ vapor. To this end, it is beneficial to use a moisture-adaptive covering, that is, a covering whose ~~water-vapour~~ water-vapor permeability varies as a function of the ambient humidity. It is expedient here to use a material for the covering 6 that has a ~~water-vapour~~ water-vapor diffusion resistance (s_d value) of 2 to 5 m diffusion-equivalent air-layer thickness when the relative humidity of the atmosphere surrounding the covering is in the range from 30 to 50%, and a ~~water-vapour~~ water-vapor diffusion resistance (s_d value) which is < 1 in diffusion-equivalent air-layer thickness when the relative humidity is in the range from 60 to 80%. A humidity of 30 to 50% is generally encountered under winter conditions. On account of the diffusion resistance that is established under these conditions, the covering, which is preferably composed of film, becomes impermeable and prevents the transport of moisture. Under summer conditions, with a humidity of 60 to 80%, the film becomes permeable again and any moisture that has collected in the interior as a result of water condensing can escape to the outside. ~~Thus~~ Thus, it is ensured that no moisture is transported from the exterior to the interior, but that any moisture that collects in the interior will always dry up by escaping to the outside. As material, film based on polyamide, especially polyamide 3, polyamide 4 or polyamide 6, has proved to be particularly suitable. Of course, it is also possible to use other ~~other~~ moisture adaptive materials, in particular of polyester, polypropylene or polyethylene, or materials of copolyamide or polyvinyl chloride. In connection with the ~~water-vapour~~ water-vapor diffusion resistance of moisture-adaptive material used for the covering, attention is drawn to the German DIN standard 52615, in which measuring techniques for ~~water-vapour~~ water-vapor diffusion resistance are defined.

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Please replace page 7, paragraph 3 with the following amended paragraph.

By virtue of the easy-to-handle modules being encased, so to speak, in a waterproof covering, it suffices to use conventional wrapping materials such as strap retainers, a hoop or film tape to make up a large package comprising several stacked and/or adjacent modules. On account of the modules being fixed in position in this way, and of their waterproof packaging, an outer covering for the large package can advantageously be ~~dispensed with~~ omitted. The large package need only be wrapped in such manner that the packet of modules is held together firmly and can be reliably handled in the usual way, for example with a fork lift.

Please replace page 8, paragraph 2 with the following amended paragraph.

Figure 5 illustrates a large package whose bottom layer is made up of three modules standing upright, each in turn consisting of three insulation rolls; on top of this layer there is a horizontally positioned module comprising three adjacent insulation rolls, and on top of this, another layer comprising three adjacent modules standing upright. A large package of this kind, in which the modules are arranged crosswise, ~~i.e.~~ i.e., with intersecting axes, is characterized by very high stability. High stability can also be achieved by omitting the crosswise-disposed middle layer and, instead, arranging the top module layer such that it is offset by 90° relative to the bottom layer. Of course, the large package is not restricted to a crosswise arrangement of this kind; much rather, the invention is also applicable to modules stacked in other ways. In the embodiment shown in Figure 5, the modules are combined to a large package by a hood-like covering 12. To illustrate the arrangement more clearly, the individual modules and the insulation rolls contained therein are shown with dashed lines, so that the crosswise arrangement, ~~i.e.~~ i.e., the orientation of the modules in a vertical and horizontal manner, is evident. For additional clarity, parts of the film covering 12 of the large package are broken away to show the interior. The large package can be transported on a pallet which, if necessary, can also be integrated in the covering 12.

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Please replace page 8, paragraph 4 with the following amended paragraph.

In the large package illustrated diagrammatically in Fig. 6, three ~~modules 5'~~ modules 5, each composed of four insulation-panel packets 10, are stacked one above the other on a ~~pallet 11~~ pallet 11'. They are held on the ~~pallet 11~~ pallet 11' by just two strap ~~retainers 12~~ retainers 12'. Since the modules are enclosed, as provided for in the invention, in a waterproof film, an outer covering is unnecessary, which is an economic advantage. An additional advantage is that a large package made up in this way can also be transported by means of a crane or a hook on a fork lift, as indicated by reference numeral 13. Once the strap retainers have been unfastened at a construction site or in a ~~D. I. Y.~~ do-it-yourself store, the individual ~~modules 5'~~ modules 5 can be conveniently handled and displayed without any danger of their being exposed to the weather-after all, they have a waterproof packaging-before they are processed or sold.